Vincotech

10-FE07PPA020I7-LK23B23Z
datasheet

***flow*PIM 1 + PFC** **650 V / 20 A**

Topology features

- 1-leg rectifier
- Open Emitter configuration
- PFC+Inverter
- Temperature sensor

Component features

- Easy paralleling
- Low collector emitter saturation voltage
- Low turn-off losses
- Positive temperature coefficient

Housing features

- Base isolation: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Solder pin
- Thermo-mechanical push-and-pull force relief

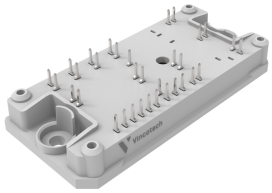
Target applications

- Embedded Drives
- Heat Pumps
- HVAC
- Industrial Drives

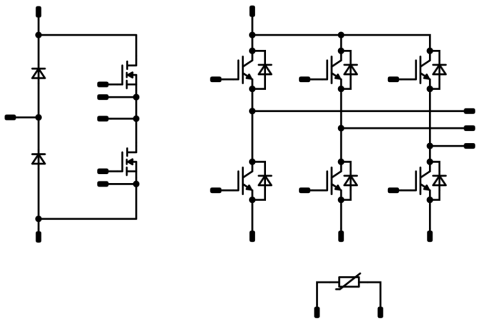
Types

- 10-FE07PPA020I7-LK23B23Z

flow 1 12 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Inverter Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ T_s = 80 °C	31	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	55	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 400 V T_j = 150 °C	3	µs
Maximum junction temperature	T_{jmax}		175	°C
Inverter Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ T_s = 80 °C	26	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	43	W
Maximum junction temperature	T_{jmax}		175	°C
PFC Switch				
Drain-source voltage	V_{DSS}		750	V
Drain current (DC current)	I_D	$T_j = T_{jmax}$ T_s = 80 °C	18	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	58	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	42	W
Gate-source voltage	V_{GSS}	static	-4 / 21	V
		dynamic	-4 / 23	V
Maximum Junction Temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Rectifier Diode				
Peak repetitive reverse voltage	V_{RRM}		1600	V
Forward current (DC current)	I_F	T_j = T_{jmax}, T_s = 80 °C	66	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms, T_j = 150 °C	400	A
Surge current capability	I^2t		800	A^2s
Total power dissipation	P_{tot}	T_j = T_{jmax}, T_s = 80 °C	96	W
Maximum junction temperature	T_{jmax}		175	°C
Module Properties				
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…+(T_{jmax} - 25)	°C
Isolation Properties				
Isolation voltage	V_{isol}	DC Test Voltage*, t_p = 2 s	6000	V
Creepage distance			>12,7	mm
Clearance			8,17	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Inverter Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}			0,0002	25	4,35	5	5,65	V
Collector-emitter saturation voltage	V_{CEsat}		15		20	25 125 150		1,32 1,4 1,43	1,65(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			20	µA
Gate-emitter leakage current	I_{GES}		20	0		25			100	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		1310		pF
Output capacitance	C_{oes}							42		pF
Reverse transfer capacitance	C_{res}							13		pF
Gate charge	Q_g	V_{CC} = 520 V	15		20	25		128		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,72		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	350	20	25 125 150		33,06 34,37 34,44		ns
Rise time	t_r					25 125 150		12,26 13,53 13,49		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		103,53 131,6 136,87		ns
Fall time	t_f					25 125 150		43,57 60,93 69,29		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,485 µC Q_{rFWD}=1,01 µC Q_{rFWD}=1,17 µC				25 125 150		0,292 0,417 0,456		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,297 0,458 0,502		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Inverter Diode										
Static										
Forward voltage	V_F				20	25 125 150		1,71 1,6 1,55	2[1]	V
Reverse leakage current	I_R	V_r = 650 V				25			20	µA
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						2,2		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=619 A/µs di/dt=837 A/µs di/dt=1097 A/µs	±15	350	20	25 125 150		11,13 15,66 16,58		A
Reverse recovery time	t_{rr}					25 125 150		103,46 146,96 168,55		ns
Recovered charge	Q_r					25 125 150		0,485 1,01 1,17		µC
Reverse recovered energy	E_{rec}					25 125 150		0,097 0,21 0,248		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		283,57 193,9 166,71		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
PFC Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		18		12	25 125 150		64 96,7 110	82(1)	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,00615	25	2,8	3,5	4,8	V
Gate to Source Leakage Current	I_{GSS}		21	0		25	-100		100	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	750		25		1	80	µA
Internal gate resistance	r_g							4		Ω
Gate charge	Q_g		18	500	12	25		48		nC
Gate to source charge	Q_{GS}							13		
Gate to drain charge	Q_{GD}							15		
Short-circuit input capacitance	C_{iss}	f = 1 Mhz	0	500	0	25		1066		pF
Short-circuit output capacitance	C_{oss}							65		
Reverse transfer capacitance	C_{rss}							7		
Diode forward voltage	V_{SD}		0		12	25		3,3		V
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						2,28		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 0,5 Ω R_{goff} = 0,5 Ω	0/18	400	12	25 125 150		8,09 7,62 7,32		ns
Rise time	t_r					25 125 150		4,08 3,84 3,91		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		32,4 35,9 36,6		ns
Fall time	t_f					25 125 150		5,12 4,49 5,08		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,113 µC Q_{rFWD}=0,142 µC Q_{rFWD}=0,164 µC				25 125 150		0,065 0,068 0,07		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,011 0,011 0,012		mWs
Peak recovery current	I_{RRM}	di/dt=2147 A/µs di/dt=2635 A/µs di/dt=2752 A/µs				25 125 150		16,86 18 19,78		A
Reverse recovery time	t_{rr}					25 125 150		13,17 14,2 14,57		ns
Recovered charge	Q_r					25 125 150		0,113 0,142 0,164		µC
Reverse recovered energy	E_{rec}					25 125 150		0,018 0,026 0,031		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3417,73 2735,47 2724,48		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Rectifier Diode										
Static										
Forward voltage	V_F				35	25 125 150		1,18 1,15 1,14	1,5(1)	V
Reverse leakage current	I_R	V_r = 1600 V				25 150			50 1000	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,99		K/W
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

(1) Value at chip level

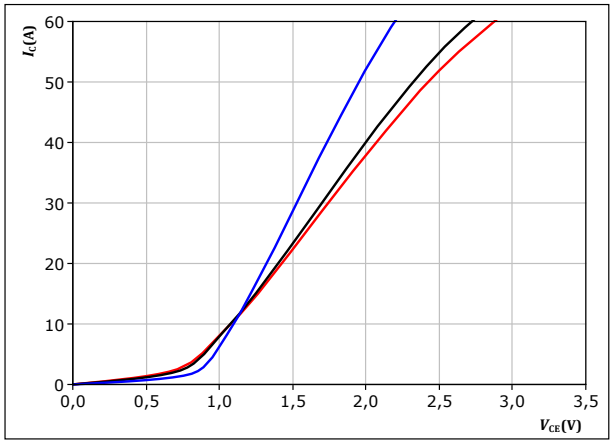
(2) Only valid with pre-applied Vincotech thermal interface material.

Inverter Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

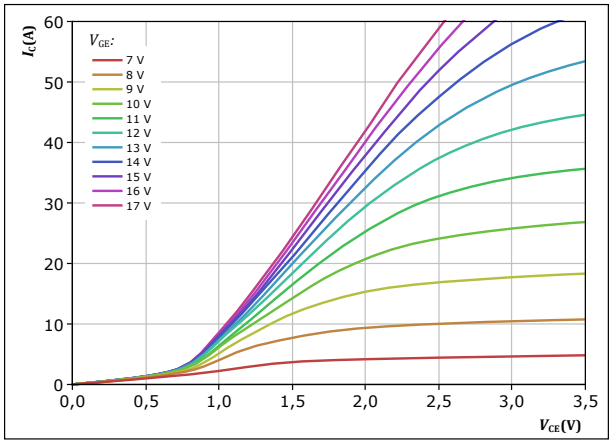


t_p =	250	µs		
V_{GE} =	15	V	T_j:	25 °C
				125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



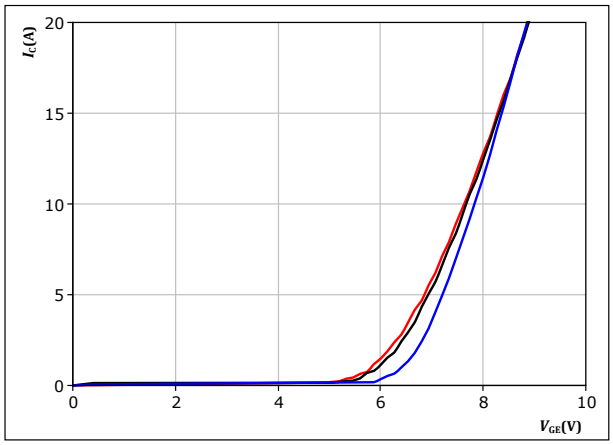
t_p =	250	µs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

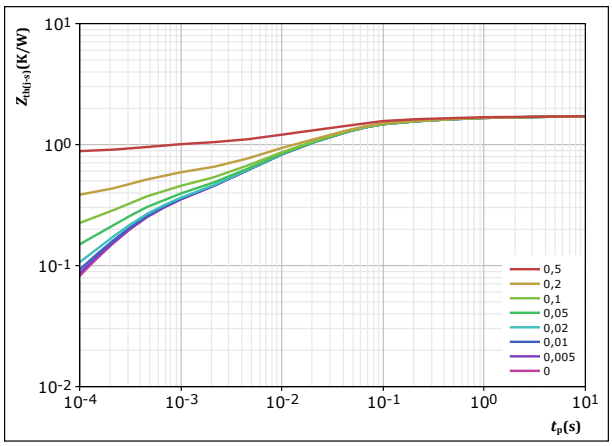


t_p =	250	µs		
V_{CE} =	9	V	T_j:	25 °C
				125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



D =	t_p / T	
$R_{th(j-s)}$ =	1,715	K/W

IGBT thermal model values

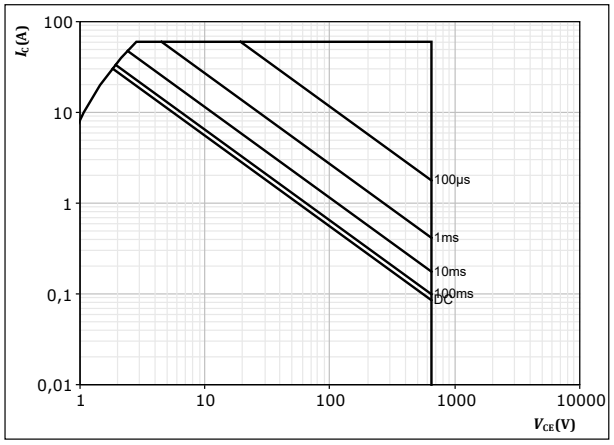
R (K/W)	τ (s)
6,71E-02	3,79E+00
1,88E-01	3,07E-01
7,59E-01	3,51E-02
4,36E-01	5,40E-03
2,68E-01	3,21E-04

Inverter Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$

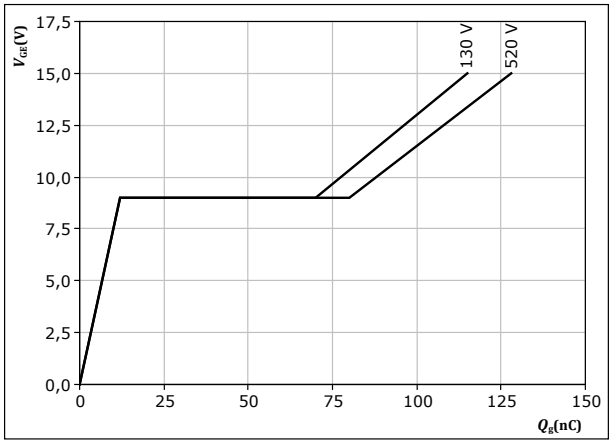


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 6. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_g)$



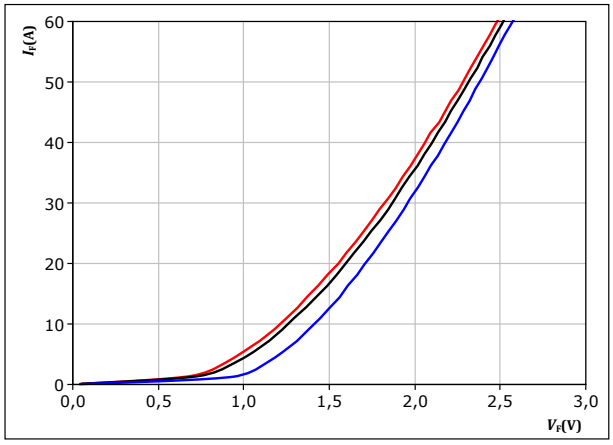
I_C = 20 A
T_j = 25 °C

Inverter Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



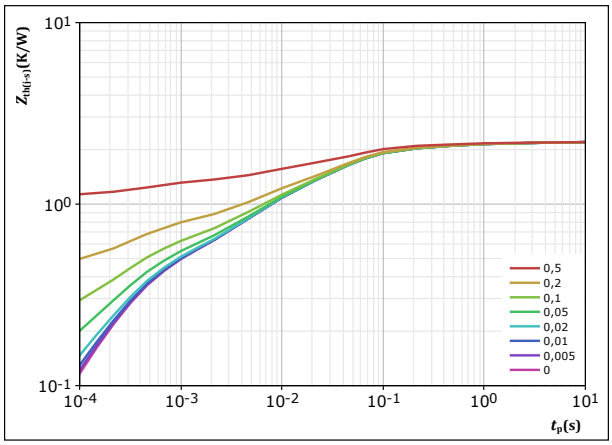
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



D = t_p / T

$R_{th(j-s)}$ = 2,197 K/W

FWD thermal model values

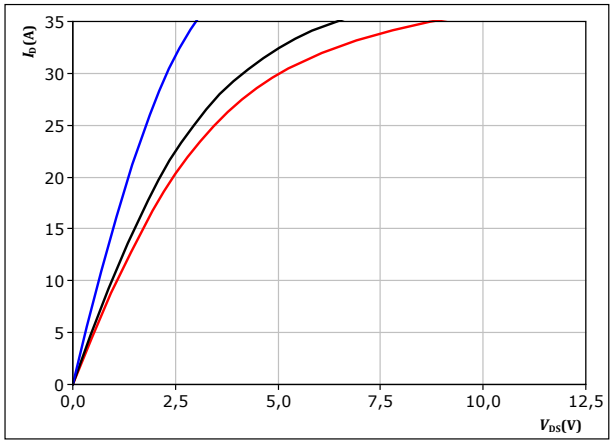
R (K/W)	τ (s)
6,66E-02	3,48E+00
2,03E-01	3,19E-01
1,01E+00	3,92E-02
5,28E-01	4,99E-03
3,95E-01	3,30E-04

PFC Switch Characteristics

figure 9. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$

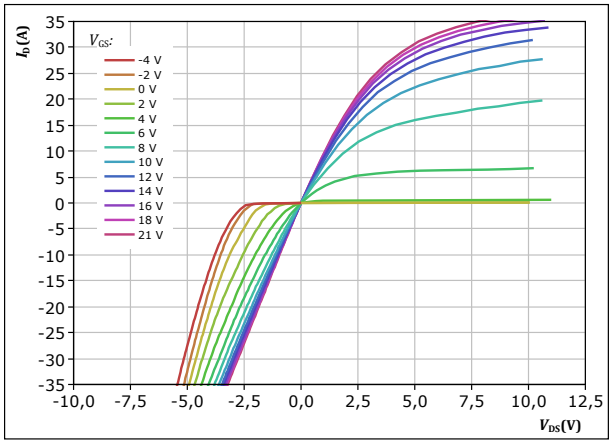


t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

figure 10. **MOSFET**

Typical output characteristics

$I_D = f(V_{DS})$



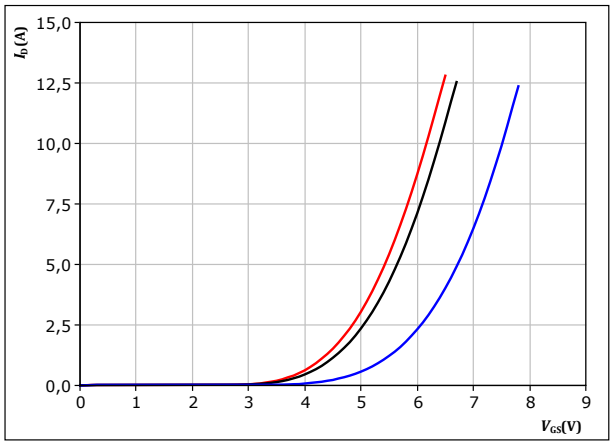
t_p =	250	µs
T_j =	150	°C

V_{GS} from -4 V to 21 V in steps of 2 V

figure 11. **MOSFET**

Typical transfer characteristics

$I_D = f(V_{GS})$

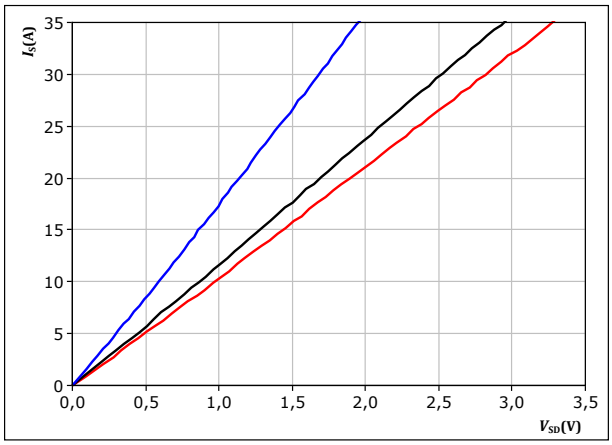


t_p =	250	µs		
V_{DS} =	24	V	T_j:	25 °C
				125 °C
				150 °C

figure 12. **MOSFET**

Typical reverse drain current characteristics

$I_{SD} = f(V_{SD})$



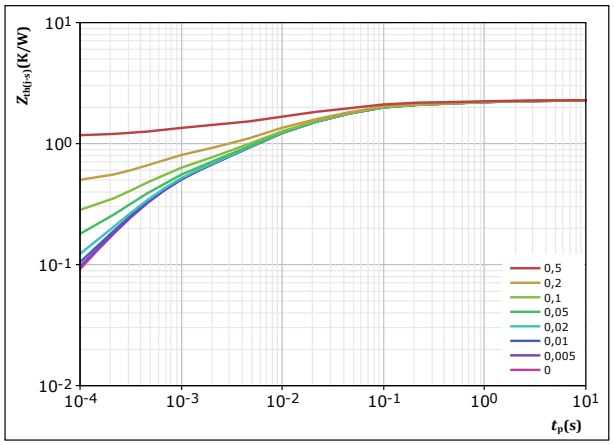
t_p =	250	µs		
V_{GS} =	18	V	T_j:	25 °C
				125 °C
				150 °C

PFC Switch Characteristics

figure 13. **MOSFET**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



$D =$ t_p / T

$R_{th(j-s)} =$ 2,283 K/W

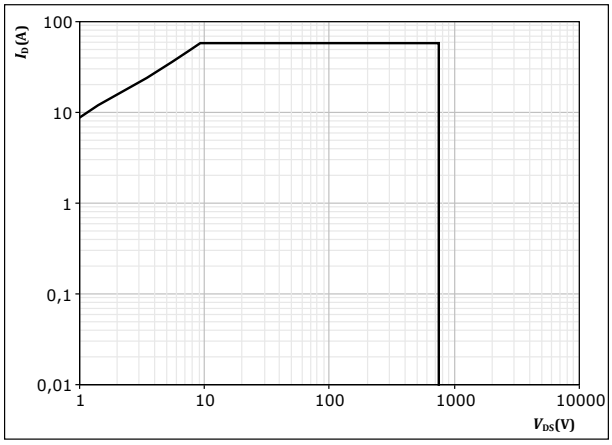
MOSFET thermal model values

R (K/W)	τ (s)
7,42E-02	7,43E+00
1,92E-01	5,44E-01
8,49E-01	4,09E-02
7,58E-01	6,07E-03
4,25E-01	4,99E-04

figure 14. **MOSFET**

Safe operating area

$I_D = f(V_{DS})$



$D =$ single pulse

$T_s =$ 80 °C

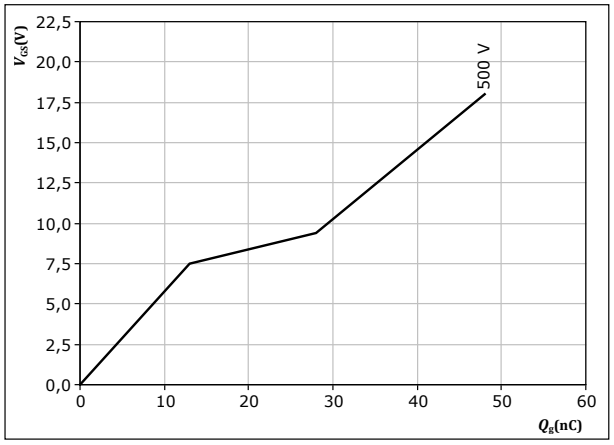
$V_{GS} =$ 18 V

$T_j =$ T_{jmax}

figure 15. **MOSFET**

Gate voltage vs gate charge

$V_{GS} = f(Q_g)$



$I_D =$ 17 A

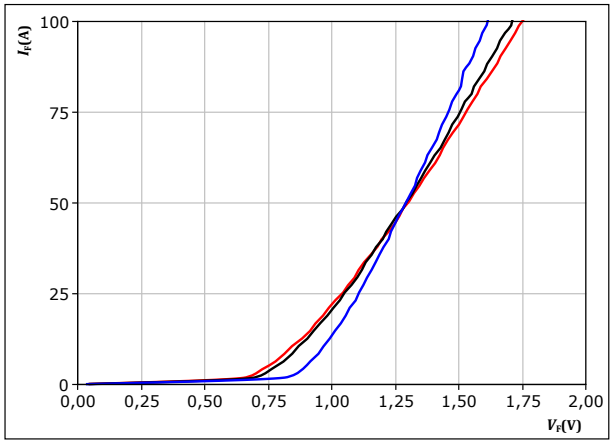
$T_j =$ 25 °C

Rectifier Diode Characteristics

figure 16. **Rectifier**

Typical forward characteristics

$I_F = f(V_F)$



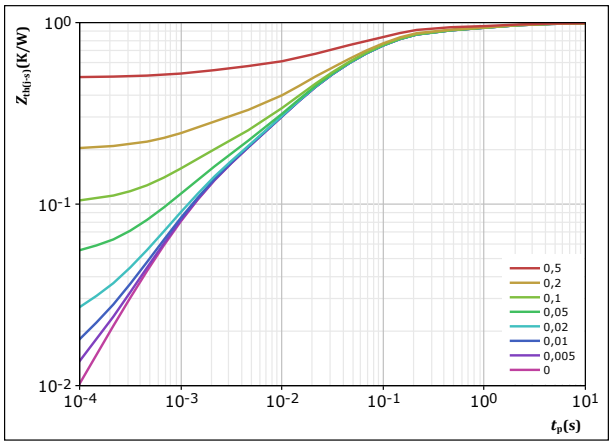
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 17. **Rectifier**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



D = t_p / T

$R_{th(j-s)}$ = 0,992 K/W

Rectifier thermal model values

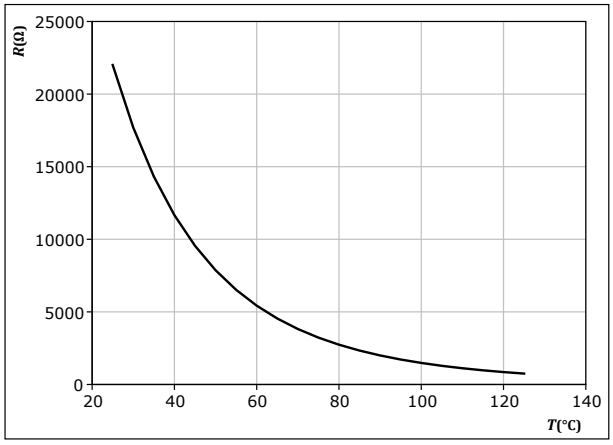
R (K/W)	τ (s)
2,09E-02	8,04E+00
1,10E-01	1,02E+00
4,89E-01	7,48E-02
2,78E-01	1,39E-02
9,90E-02	1,25E-03

Thermistor Characteristics

figure 18. **Thermistor**

Typical NTC characteristic as function of temperature

$R_T = f(T)$

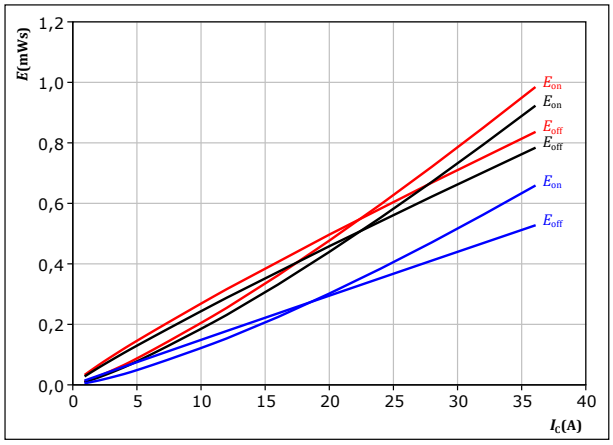


Inverter Switching Characteristics

figure 19. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



With an inductive load at

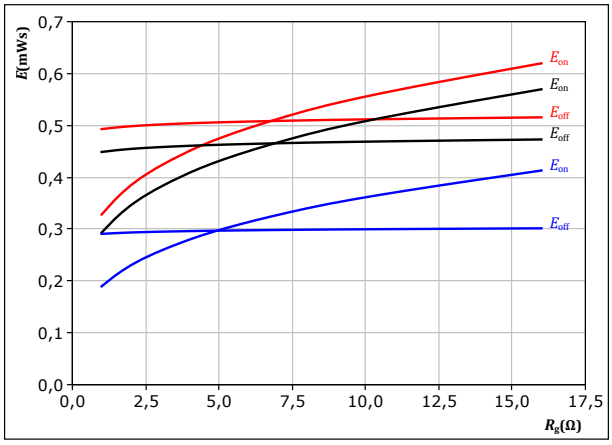
V_{CE} =	350	V	
V_{GE} =	±15	V	
R_{gon} =	4	Ω	
R_{goff} =	4	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 20. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

$E = f(R_g)$



With an inductive load at

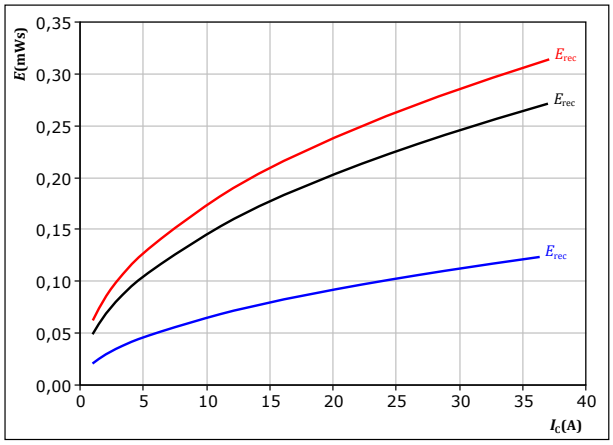
V_{CE} =	350	V	
V_{GE} =	±15	V	
I_C =	20	A	

T_j: 25 °C, 125 °C, 150 °C

figure 21. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

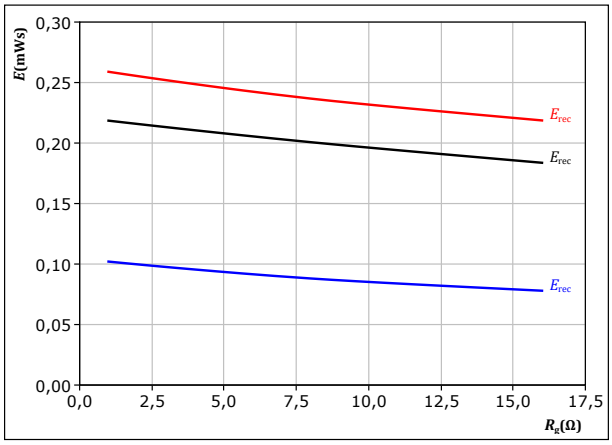
V_{CE} =	350	V	
V_{GE} =	±15	V	
R_{gon} =	4	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 22. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

V_{CE} =	350	V	
V_{GE} =	±15	V	
I_C =	20	A	

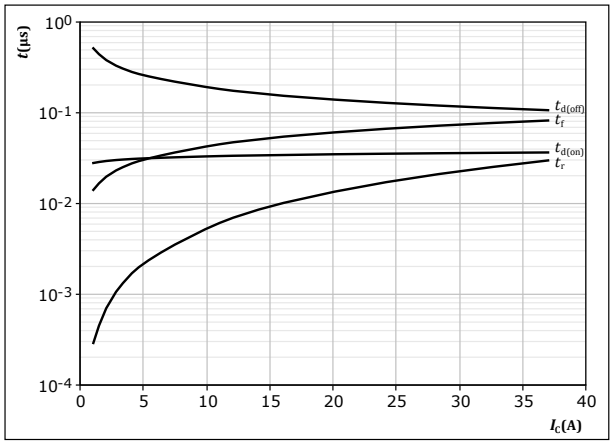
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 23. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



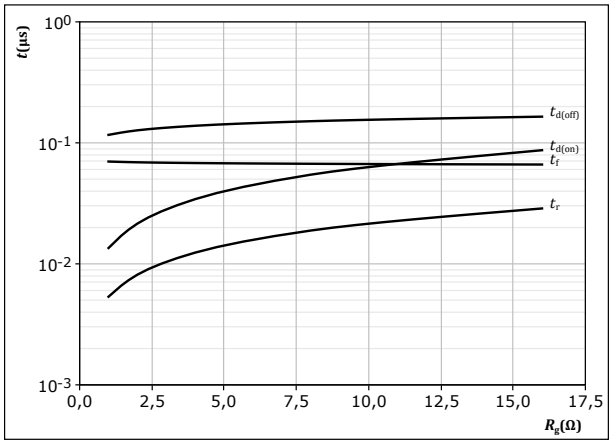
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 24. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

$t = f(R_g)$



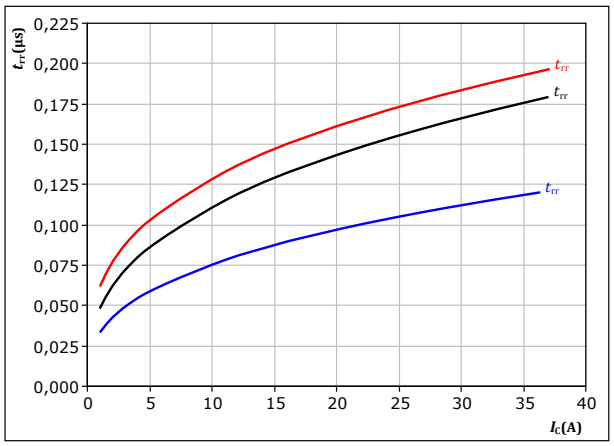
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	20	A

figure 25. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

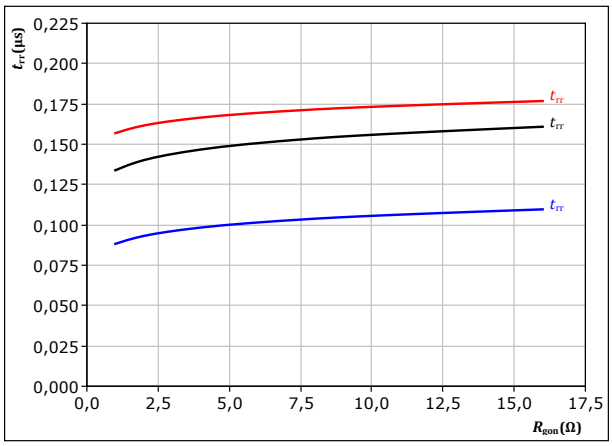
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 26. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = f(R_{gon})$



With an inductive load at

V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	20	A

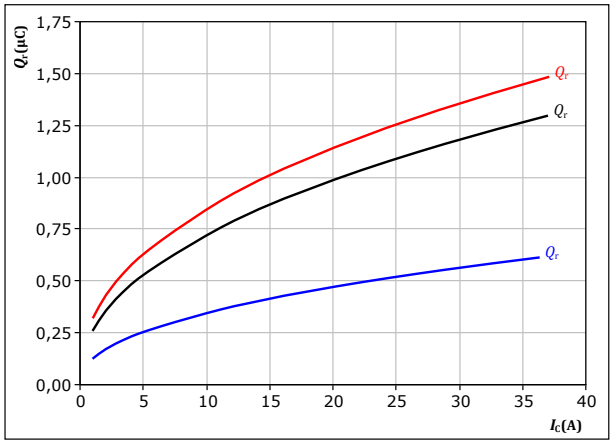
T_j: 25 °C, 125 °C, 150 °C

Inverter Switching Characteristics

figure 27. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



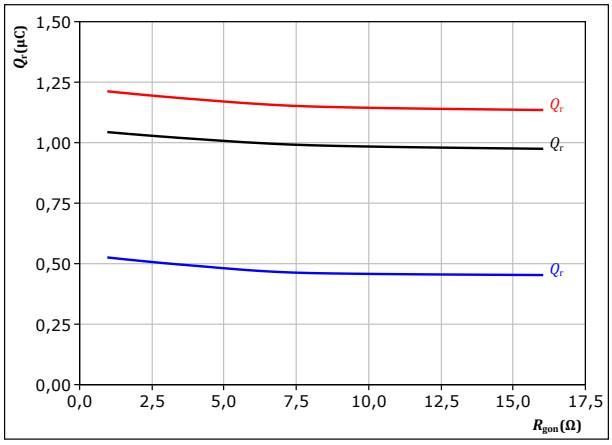
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 28. **FWD**

Typical recovered charge as a function of IGBT turn on gate resistor

$Q_r = f(R_{gon})$



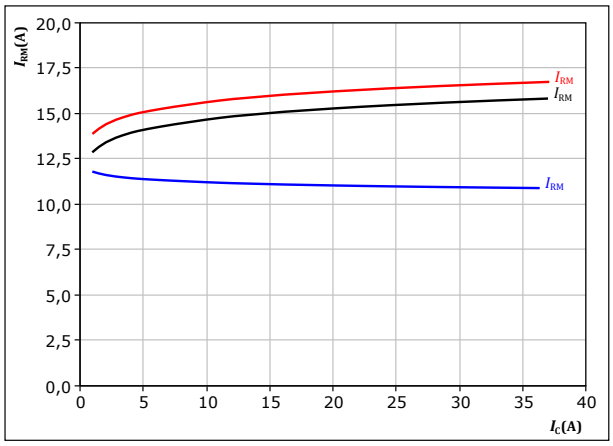
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	20	A		150 °C

figure 29. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



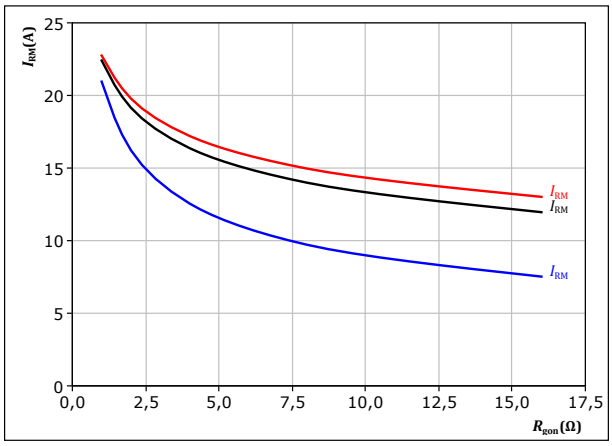
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 30. **FWD**

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

$I_{RM} = f(R_{gon})$



With an inductive load at

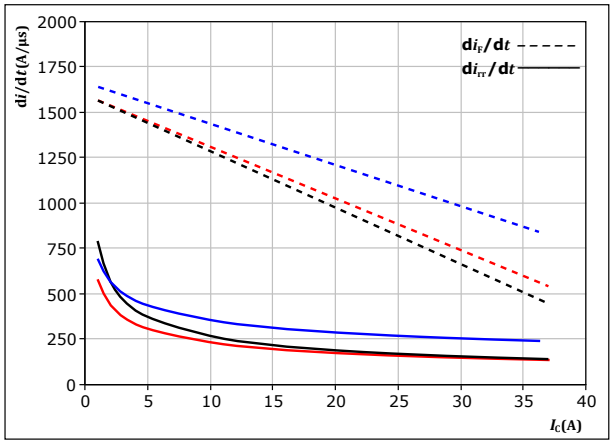
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	20	A		150 °C

Inverter Switching Characteristics

figure 31. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

di_F/dt, di_{rr}/dt = f(I_C)



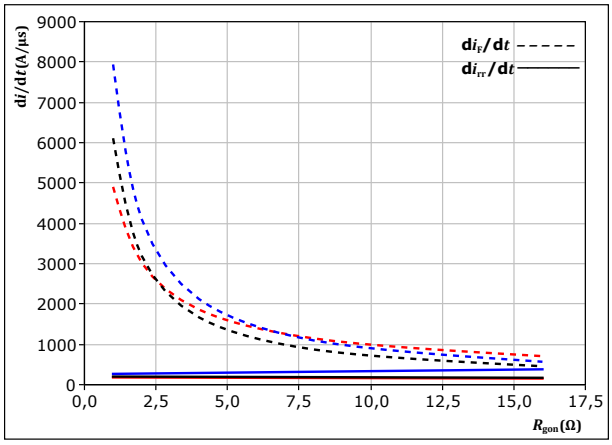
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 32. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

di_F/dt, di_{rr}/dt = f(R_{gon})



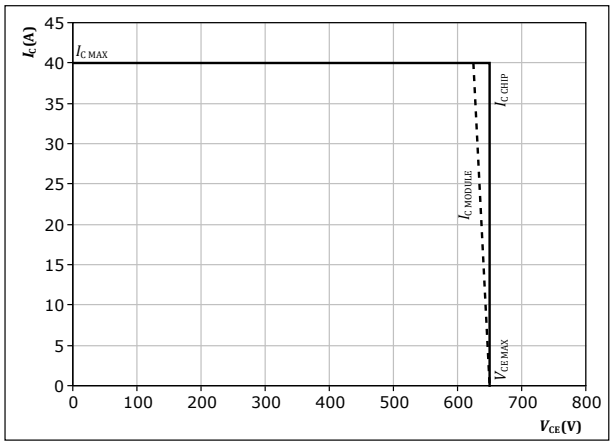
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	20	A		150 °C

figure 33. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

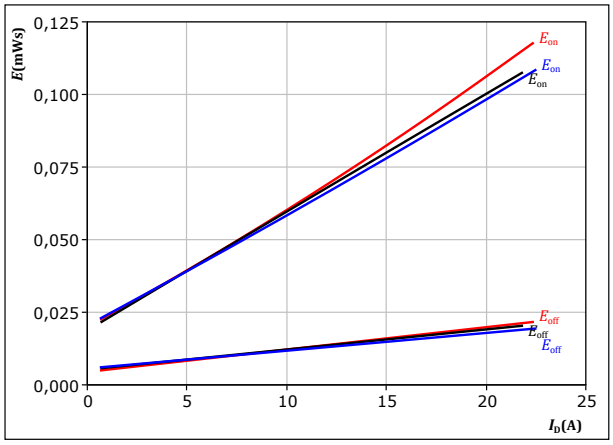
T_j =	150	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

PFC Switching Characteristics

figure 34. **MOSFET**

Typical switching energy losses as a function of drain current

$E = f(I_D)$



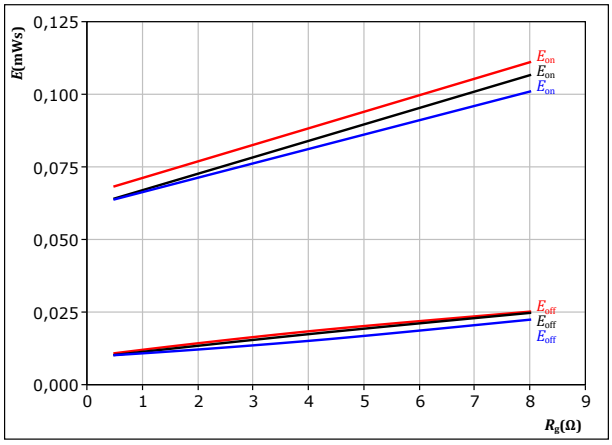
With an inductive load at

V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/18	V		125 °C
R_{gon} =	0,5	Ω		150 °C
R_{goff} =	0,5	Ω		

figure 35. **MOSFET**

Typical switching energy losses as a function of MOSFET turn on gate resistor

$E = f(R_g)$



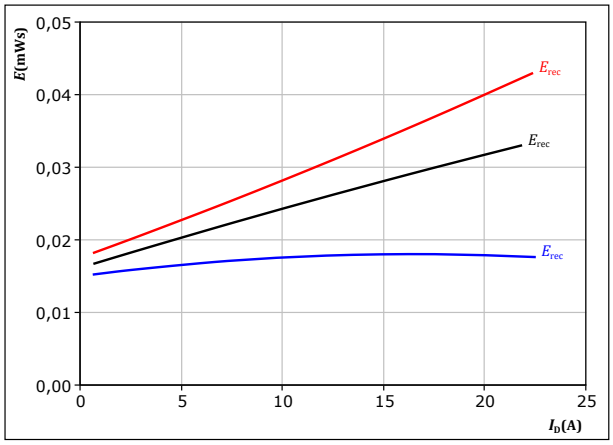
With an inductive load at

V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/18	V		125 °C
I_D =	12	A		150 °C

figure 36. **MOSFET**

Typical reverse recovered energy loss as a function of drain current

$E_{rec} = f(I_D)$



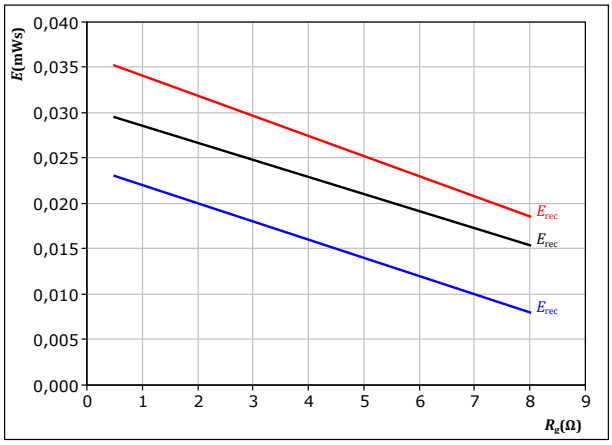
With an inductive load at

V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/18	V		125 °C
R_{gon} =	0,5	Ω		150 °C

figure 37. **MOSFET**

Typical reverse recovered energy loss as a function of MOSFET turn on gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

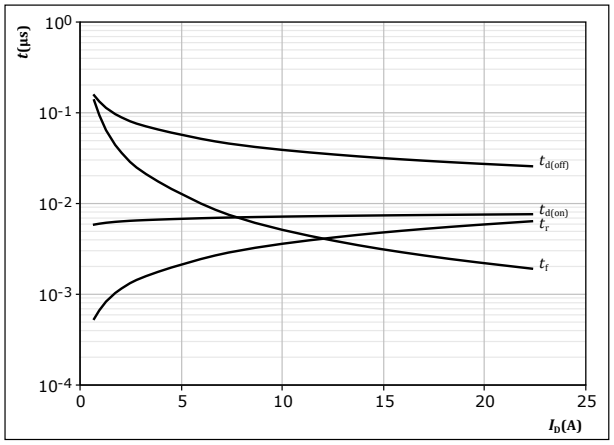
V_{DS} =	400	V	T_j:	25 °C
V_{GS} =	0/18	V		125 °C
I_D =	12	A		150 °C

PFC Switching Characteristics

figure 38. **MOSFET**

Typical switching times as a function of drain current

$t = f(I_D)$



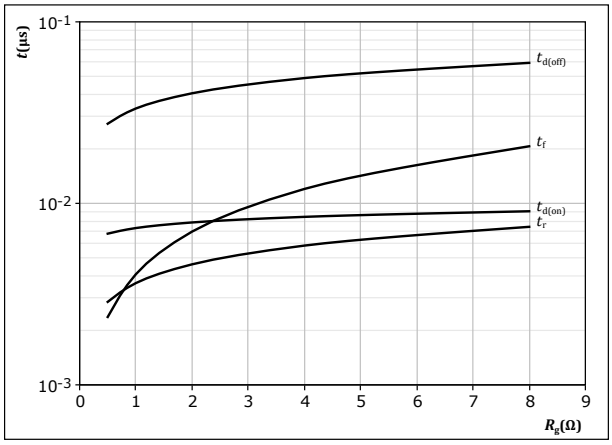
With an inductive load at

T_j =	150	°C
V_{DS} =	400	V
V_{GS} =	0/18	V
R_{gon} =	0,5	Ω
R_{goff} =	0,5	Ω

figure 39. **MOSFET**

Typical switching times as a function of MOSFET turn on gate resistor

$t = f(R_g)$



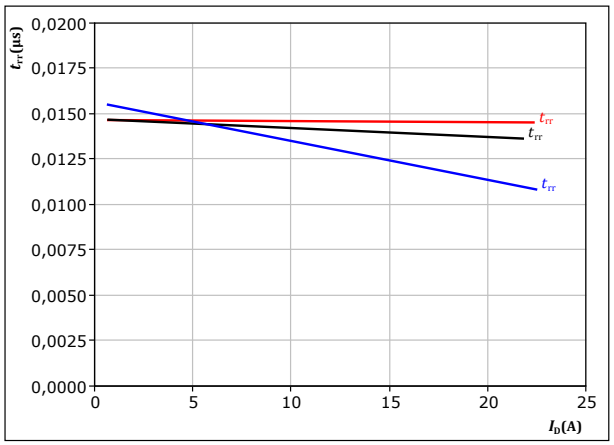
With an inductive load at

T_j =	150	°C
V_{DS} =	400	V
V_{GS} =	0/18	V
I_D =	12	A

figure 40. **MOSFET**

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



At

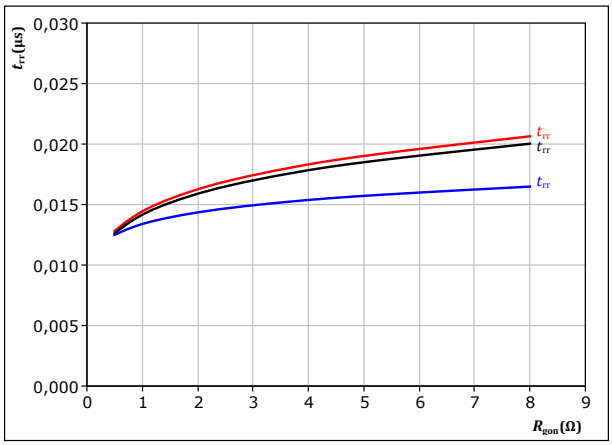
V_{DS} =	400	V
V_{GS} =	0/18	V
R_{gon} =	0,5	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 41. **MOSFET**

Typical reverse recovery time as a function of MOSFET turn on gate resistor

$t_{rr} = f(R_{gon})$



At

V_{DS} =	400	V
V_{GS} =	0/18	V
I_D =	12	A

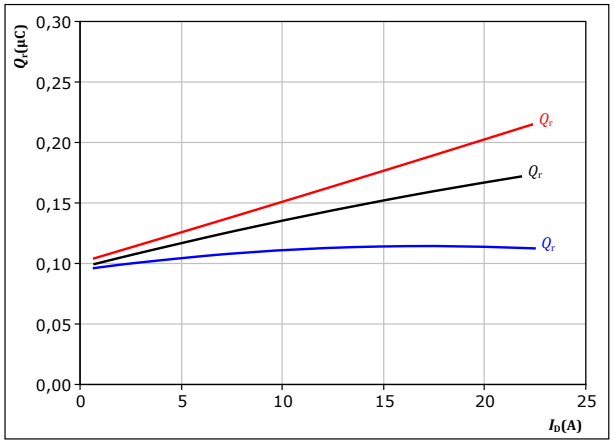
T_j: 25 °C, 125 °C, 150 °C

PFC Switching Characteristics

figure 42. **MOSFET**

Typical recovered charge as a function of drain current

$Q_r = f(I_D)$

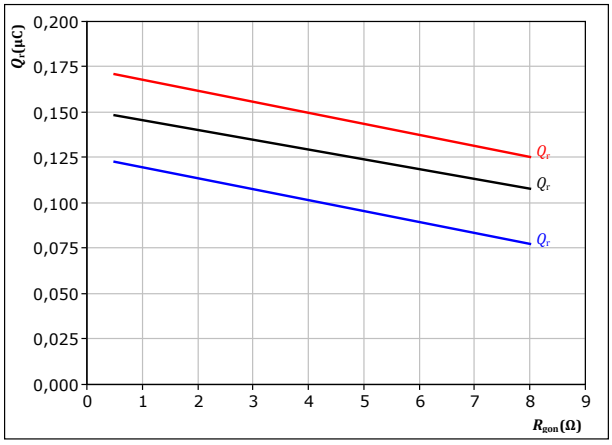


At					
	V_{DS} =	400	V		
	V_{GS} =	0/18	V	T_j:	25 °C
	R_{gon} =	0,5	Ω		125 °C
					150 °C

figure 43. **MOSFET**

Typical recovered charge as a function of MOSFET turn on gate resistor

$Q_r = f(R_{gon})$

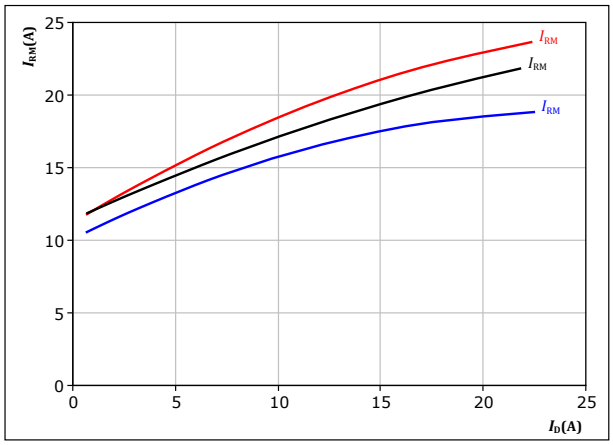


At					
	V_{DS} =	400	V		
	V_{GS} =	0/18	V	T_j:	25 °C
	I_D =	12	A		125 °C
					150 °C

figure 44. **MOSFET**

Typical peak reverse recovery current as a function of drain current

$I_{RM} = f(I_D)$

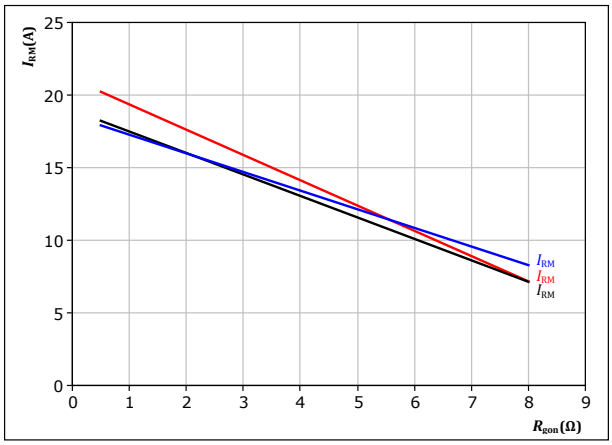


At					
	V_{DS} =	400	V		
	V_{GS} =	0/18	V	T_j:	25 °C
	R_{gon} =	0,5	Ω		125 °C
					150 °C

figure 45. **MOSFET**

Typical peak reverse recovery current as a function of MOSFET turn on gate resistor

$I_{RM} = f(R_{gon})$



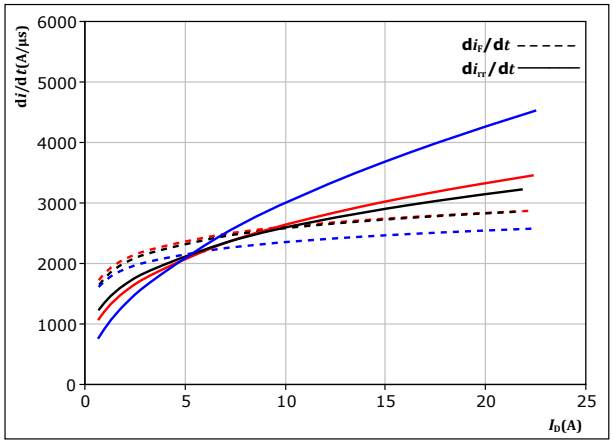
At					
	V_{DS} =	400	V		
	V_{GS} =	0/18	V	T_j:	25 °C
	I_D =	12	A		125 °C
					150 °C

PFC Switching Characteristics

figure 46. **MOSFET**

Typical rate of fall of forward and reverse recovery current as a function of drain current

di_F/dt, di_{rr}/dt = f(I_D)

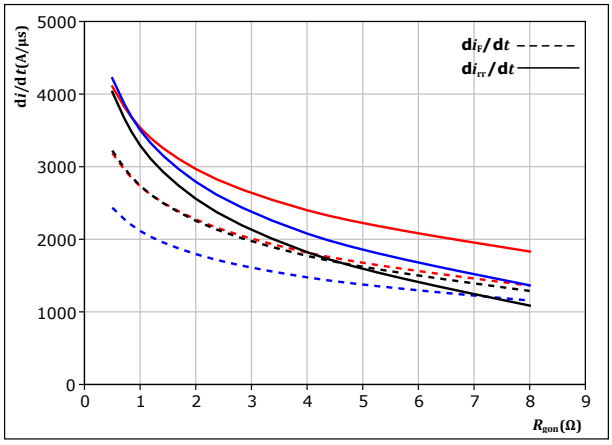


At	V_{DS} =	400	V		
	V_{GS} =	0/18	V	T_j:	25 °C / 125 °C / 150 °C
	R_{gon} =	0,5	Ω		

figure 47. **MOSFET**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

di_F/dt, di_{rr}/dt = f(R_{gon})

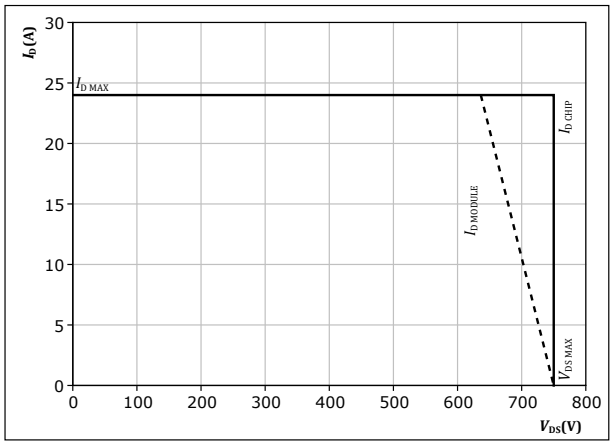


At	V_{DS} =	400	V		
	V_{GS} =	0/18	V	T_j:	25 °C / 125 °C / 150 °C
	I_D =	12	A		

figure 48. **MOSFET**

Reverse bias safe operating area

I_D = f(V_{DS})



At	T_j =	150	°C
	R_{gon} =	0,5	Ω
	R_{goff} =	0,5	Ω

Inverter Switching Definitions

figure 49. **IGBT**

Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{tEoff} = integrating time for E_{off})

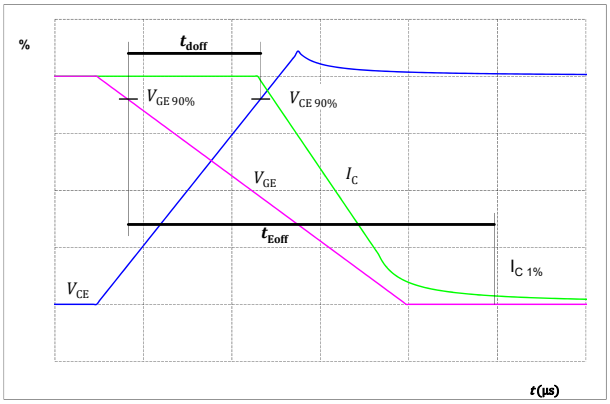


figure 50. **IGBT**

Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})

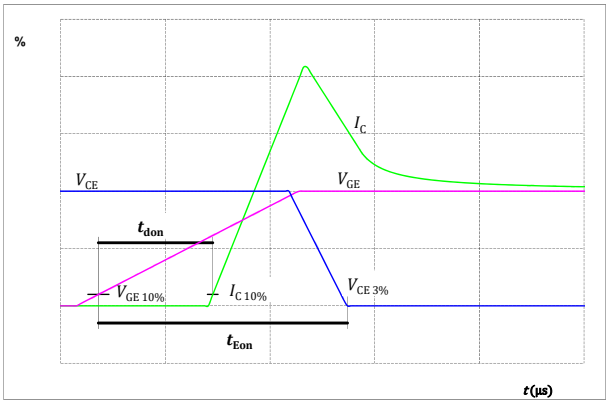


figure 51. **IGBT**

Turn-off Switching Waveforms & definition of t_f

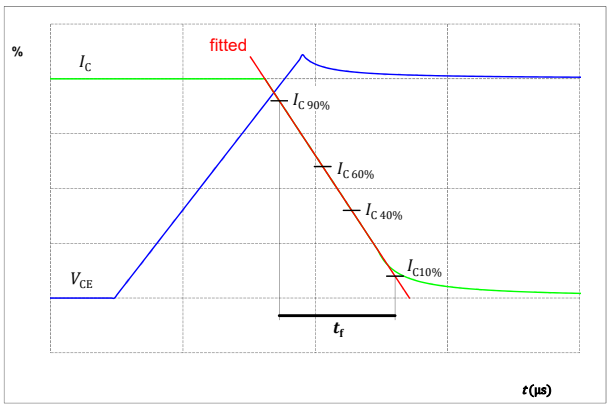
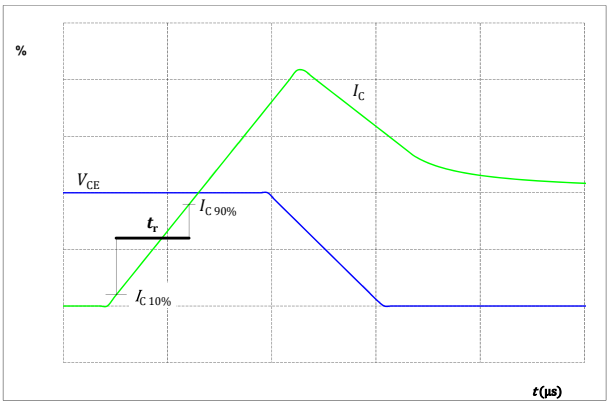


figure 52. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Inverter Switching Definitions

figure 53. **FWD**

Turn-off Switching Waveforms & definition of t_{rr}

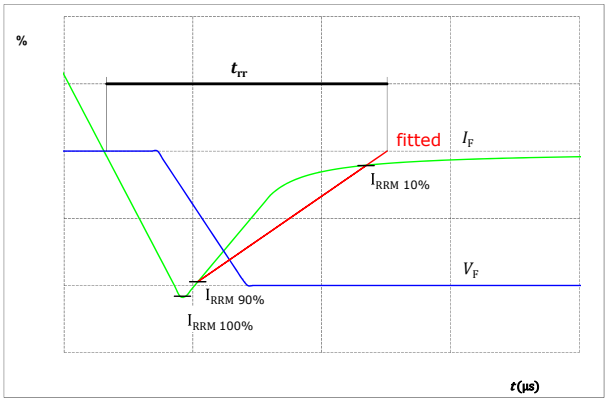
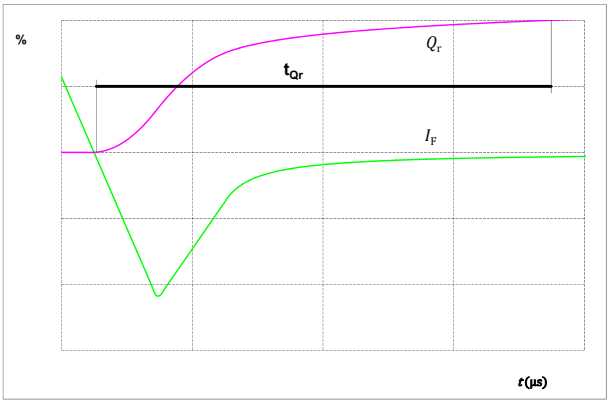


figure 54. **FWD**

Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



PFC Switching Definitions

figure 49. MOSFET

Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})

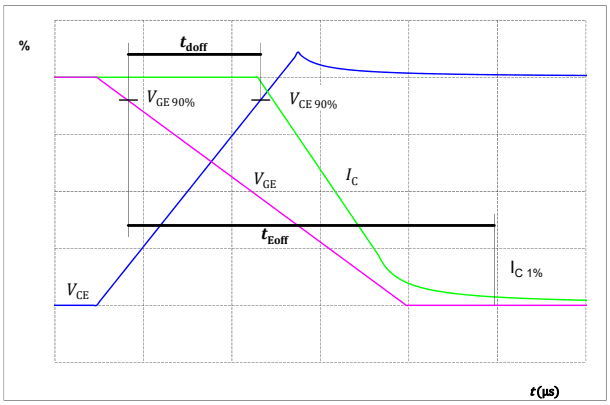


figure 50. MOSFET

Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})

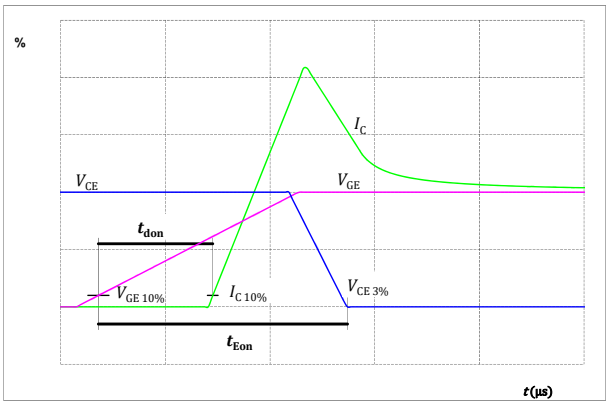


figure 51. MOSFET

Turn-off Switching Waveforms & definition of t_f

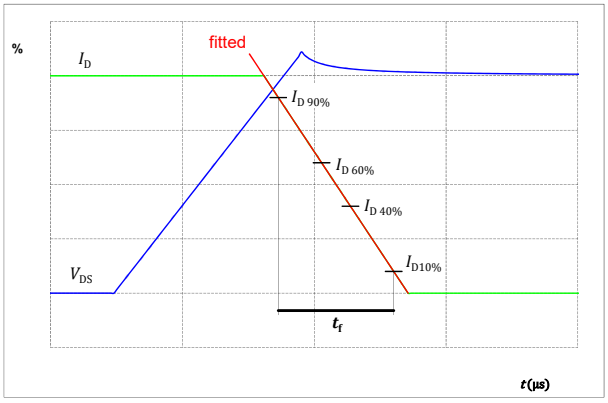
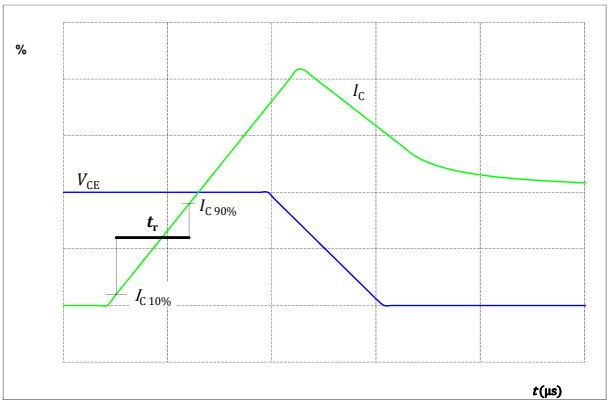


figure 52. MOSFET

Turn-on Switching Waveforms & definition of t_r



PFC Switching Definitions

figure 53. **FWD**

Turn-off Switching Waveforms & definition of t_{trr}

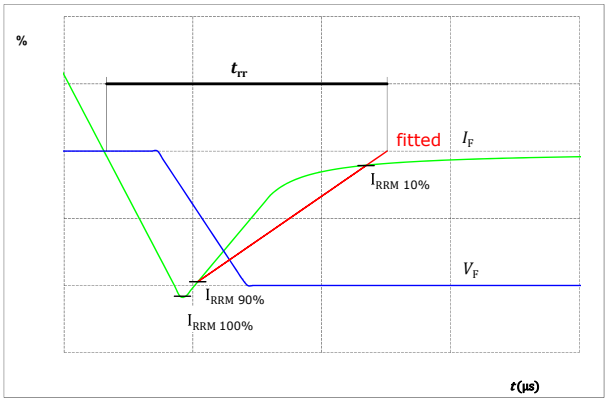


figure 54. **FWD**

Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})

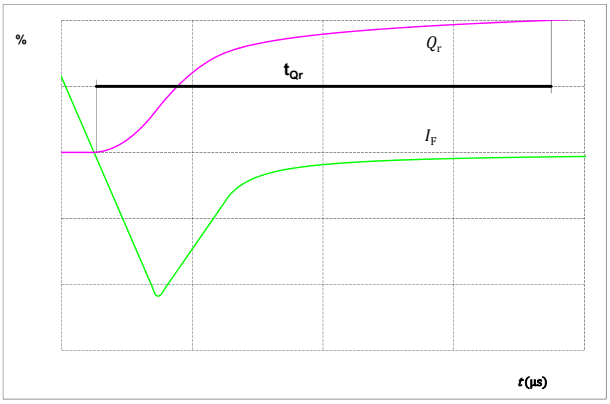
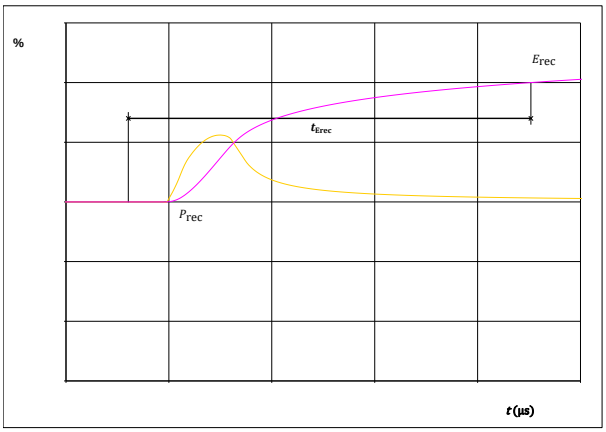


figure 55. **FWD**

Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec} = integrating time for E_{rec})



Ordering Code

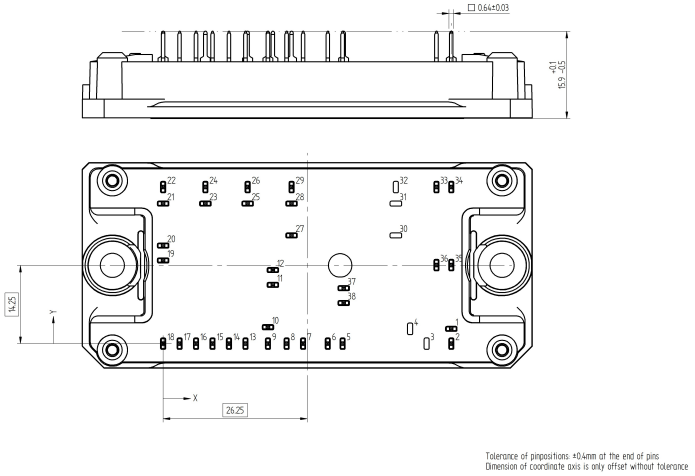
Version	Ordering Code
Without thermal paste	10-FE07PPA020I7-LK23B23Z
With thermal paste (5,2 W/mK, PTM6000HV)	10-FE07PPA020I7-LK23B23Z-/7/

Marking

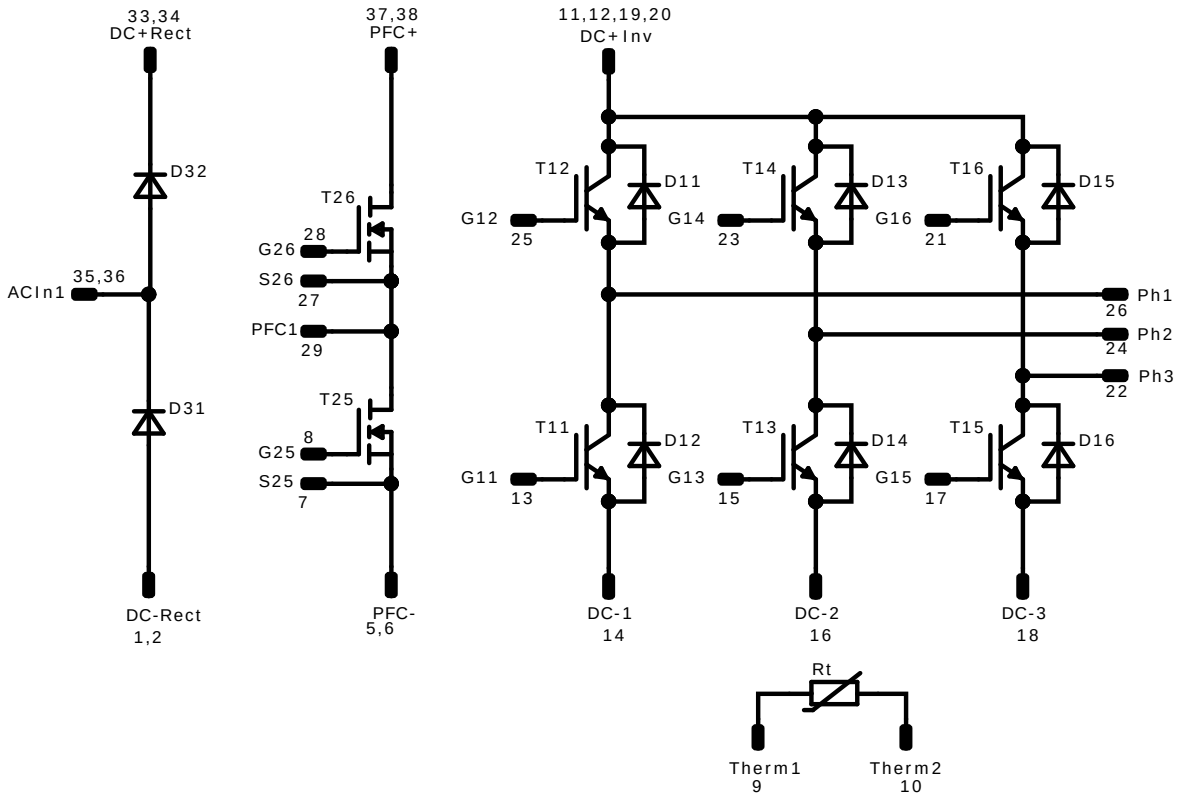
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	52,5	2,7	DC-Rect
2	52,5	0	DC-Rect
3	not assembled		
4	not assembled		
5	32,7	0	PFC-
6	30	0	PFC-
7	25,5	0	S25
8	22,5	0	G25
9	19,1	0	Therm1
10	19,1	3	Therm2
11	20	10,7	DC+Inv
12	20	13,4	DC+Inv
13	15	0	G11
14	12	0	DC-1
15	9	0	G13
16	6	0	DC-2
17	3	0	G15
18	0	0	DC-3
19	0	15,15	DC+Inv
20	0	17,85	DC+Inv
21	0	25,5	G16
22	0	28,5	Ph3
23	7,7	25,5	G14
24	7,7	28,5	Ph2
25	15,4	25,5	G12
26	15,4	28,5	Ph1
27	23,4	19,7	S26
28	23,4	25,5	G26
29	23,4	28,5	PFC1
30	not assembled		
31	not assembled		
32	not assembled		
33	49,8	28,5	DC+Rect
34	52,5	28,5	DC+Rect
35	52,5	14,3	ACIn1
36	49,8	14,3	ACIn1
37	32,9	10,1	PFC+
38	32,9	7,4	PFC+



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	650 V	20 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	650 V	20 A	Inverter Diode	
T25, T26	MOSFET	750 V	65 mΩ	PFC Switch	
D31, D32	Rectifier	1600 V	35 A	Rectifier Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}$=175°C and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-FE07PPA020I7-LK23B23Z-D1-14	20 May. 2026	Initial Release	